(54) Title: TRAFFIC SIGN DEVICE

(57) Abstract: A traffic sign device with at least one traffic information symbol (3), comprising at least one warning means (1) which may be activated by means of energy supply for emitting visible light for the purpose of increasing the information capability of the device to road-users, the warning means including at least one light emitting unit (2) arranged at an independent traffic information symbol or at a substantial part of a traffic information symbol, and/or the warning means having such a design that the warning means constitutes said traffic information symbol or a substantial part thereof both when the warning means is in an activated state and in a non-activated state, and an installation for making a connection to a specific traffic section, road-users on a way, for instance a highway, aware that there is reason to be careful, the installation comprising at least two traffic signs located along the way and at different distances from the traffic section, the traffic signs of the installation each including at least one warning means which may be activated by means of energy supply for emitting visible light.
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
TRAFFIC SIGN DEVICE

FIELD OF THE INVENTION AND PRIOR ART

The invention is related to a traffic sign device with at least one traffic information symbol, comprising at least one warning means which may be activated by means of energy supply for emitting visible light for the purpose of increasing the capability of the device to transmit information to road-users, and an installation for making, in connection to a specific traffic section, road-users on a way, e.g. a highway, aware that there is reason to be careful, the installation comprising at least two traffic signs located along the way and at different distances from the traffic section.

As far as the applicants know there does not exist any devices adapted to warn road-users at a specific traffic section and thereby make them aware that there is particular reason to be careful. The traffic sections can for example be sections of a highway and/or permanent or temporary traffic installations such as crossings, bridges, ferry berths, road-work etc.

Although the invention may be applied to a very large number of traffic situations, the invention will hereinafter first and foremost be described in connection with crossings for exemplifying but not at all limiting purposes.

The intended crossings are of level crossing type and can be crossings of a first way in the form of a railway, and a second way in the form of a highway, bicycle way or similar. In the term "railway" is included ways and tracks for trains, commuter
trains, street car, rail-car, subway trains etc. Today there are in fact signs warning road-users that there is a crossing in the direction of travel within a relatively short distance. However, these signs have the disadvantage of being static in the sense that they cannot be activated such that the degree of warning is raised in the event of a particularly dangerous/hazardous situation. These situations can for instance be when a train will pass the crossing or when a train is approaching the crossing and an object at the same time is present in the crossing area. Other situations when it is desirable to warn the road-users in a more efficient manner are when it is disadvantageous weather conditions, e.g. fog or snowstorm, with the result of reduced visibility. Further examples of hazardous situations, when road-users should be warned to a greater extent than otherwise, are at slippery road conditions and in situations when existing protecting systems are out of order for some reason, for instance if the gates at a railway crossing cannot be lowered. Furthermore, there can be reason to permanently have a warning system which to a greater extent attracts the attention of the road-users in certain cases, even if there is not particular danger, for instance due to the way section before the crossing being such that the visibility for road-users is bad and/or that there is a strong inclination of the way immediately before the crossing, which otherwise can lead to that the road-user not manages to stop well in time before the crossing.

One of the applicants has previously, in the Swedish patent 469 748, proposed a device for increasing safety at crossings of railways and other ways, which device is adapted to supervise the crossing area, e.g. the area between railway gates, so as to detect objects present in the crossing area, such as vehicles and people, for the purpose of avoiding these being hit by trains.
SUMMARY OF THE INVENTION

A first object of the invention is to provide a traffic sign device of flexible kind which makes it possible to increase the information transmission capability from a first level to at least a second level, where the device at the second level is capable of attracting the attention of road-users to a greater extent than at the first level, when desired.

Furthermore, a second object of the invention is to provide an installation including traffic signs by means of which it is possible to increase the information transmission capability/warning capability from a first level to at least a second level for making road-users aware that there is reason to be careful in connection to a specific traffic section. Such an installation can be used for instance for making road-users aware that there is reason to be extra careful in connection to a crossing.

The above first object is achieved by providing a traffic sign device where the warning means includes at least one light emitting unit arranged at said traffic information symbol or at a substantial part of the traffic information symbol and/or a traffic sign device where the warning means has such a design that the warning means constitutes said traffic information symbol or a substantial part thereof both when the warning means is in an activated state and in a non-activated state.

According to a preferred embodiment of the invention, where the warning means may be activated by means of energy supply to transmit intermittent visible light, the warning means constitutes an extremely efficient means for further attracting the attention of road-users. In connection herewith the attention of road-users can be attracted in a very efficient manner and they can be given important traffic information in the form of for instance warnings or directions. They can for instance be in-
formed that there is a level crossing further ahead in the direction of travel and that there is reason to be extra careful on that occasion.

5 The second object is achieved by providing an installation where at least two traffic signs each includes at least one warning means for emitting visible light which may be activated by means of energy supply.

10 According to a preferred embodiment of the invention, where the installation comprises at least three traffic signs located along a way and at different distances from a traffic section, each traffic sign including said traffic information symbol of distance indicating type, which traffic information symbols are different from each other, for the purpose of indicating to road-users on the way the distance between the respective traffic sign and the traffic section, there is provided an installation which has the capability of increasing the warning capability from a first level to a second higher level and at the same time give road-users information about the distance up to the traffic section. By using three traffic signs located at different distances from for instance a crossing, the road-users accordingly get information on three occasions about the distance up to the crossing at the same time as the warning means, by their emission of light, further draw the attention of the road-users to that there is such a situation in connection to or in the vicinity of the crossing that approaching road-users should be more careful than normally.

30 According to a further preferred embodiment of the invention, where the installation includes a signal processing and control unit to provide for control of the energy supply to the warning means, and especially in conjunction with another embodiment, where the installation also includes a supervision member comprising a detector for supervising the crossing area of a
crossing in connection with said crossing, so as to detect objects present in the crossing area by means of the detector, and the supervision member is connected to the warning means through said signal processing and control unit for turning on the energy supply to the warning means when objects have been detected so as to activate the warning means to thereby emit visible light, there is consequently provided an installation which is capable of registrating a hazardous situation as well as activating the warning means when there is such a situation. The installation according to this embodiment has a complete system for supervising a crossing area in a crossing and detecting objects present in the crossing area with means for subsequent signal processing and for controlling the energy supply to the warning means, which thereby emit light so that drivers and other road-users in a simple and very efficient manner are made aware that there is a hazardous situation. As previously indicated, such a hazardous situation can arise for instance when a vehicle of some kind, such as a petrol truck, which quite possibly could be stuck or cannot be moved from the crossing area for some other reason, is present in the crossing area. If additionally a train approaches the crossing on this occasion, there is a very hazardous situation.

25 BRIEF DESCRIPTION OF THE DRAWINGS

Referring to appended drawings, exemplary embodiments of the invention will be described hereinafter.

30 On the drawings

Fig 1 is a front view of a traffic sign device according to the invention including a warning means with three light emitting units,
Fig 2 is an alternative embodiment of the traffic sign device according to the invention of Fig 1 including a warning means with two light emitting units.

Fig 3 is a front view of a traffic sign device according to the invention including a warning means designed as a traffic information symbol.

Fig 4 is an alternative design of the traffic sign device according to the invention of Fig 3.

Fig 5 is a view of an installation according to the invention at a crossing of a highway and a railway.

Fig 6 is a perspective view of a railway gate arranged with a detector thereon, at a crossing of a railway and another way, in which furthermore a block diagram is included.

Fig 7 is a view from above of the railway gate illustrated in Fig 6.

Fig 8 is a view of the railway gate observed from the crossing area showing how the detector could be applied to the gate, and

Fig 9 is a view from above of a crossing provided with gates with a detector schematically shown arranged on a carrier separate from the gate in connection to a crossing.

**DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

In Fig 1 is illustrated a traffic sign device according to the invention with a warning means 1 comprising three light emitting
units 2. These units 2 can be lighting devices of different kinds. For instance such with diodes or using laser or lamps producing light with filament or by electric discharge in gas etc., or other lighting device suited for the purpose. The warning means 1 accordingly has the capability of emitting light when activated by means of energy supply, which light can be continuous or of intermittent kind, for the purpose of increasing the capability of the device to transmit information to road-users. The warning means 1 is, according to the invention, located at a traffic information symbol 3. The traffic information symbol 3 includes three substantial parts 4, three oblique rectangles to be more precise, the respective light emitting unit 2 being arranged at the respective rectangle 4.

The impression of the traffic information symbol 3 when emitting light from the device is emphasized by this placement of the units 2, and it is consequently possible to increase the information transmission capability/warning capability of the device from a first level, when the light emitting units 2 are in a non-activated state and only the rest of the device contributes to informing or directing road-users, to a second higher level, when the units 2 are in an activated state and emit light, at which the device is capable of informing, warning or directing road-users to a greater extent.

The traffic sign device in the example includes a warning sign 5 for informing road-users of a present railway crossing. The sign 5 is usually located at a highway for indicating a crossing of a railway and said highway to drivers, which crossing can be of the type with lowerable gates or of the type without such.

It is to be pointed out that the number of light emitting units 2 can be varied within the scope of the invention and furthermore they can be combined with a large number of different traffic information symbols 3 and/or substantial parts thereof. In con-
nection herewith it should also be mentioned that the term traffic information symbol 3 is intended to be interpreted in a wide sense including for instance symbols, figures, text etc.

Although it is described herein how the invention can be applied to crossings of ways at first hand, it is emphasized that the invention can be applied to a large number of different traffic situations. In fact, the invention can be applied to arbitrary traffic section where one wants to attract the attention of road-users to a greater extent during certain periods for some reason. These traffic sections can be for instance a road section where strong winds blow during certain periods or slippery road conditions often exist or where there is a large risk of animal related accidents at certain times of day or night etc. The traffic sections can also include permanent or temporary traffic installations of the type of bridges, crossings, roundabouts, ferry berths, road-work etc.

In Fig 2 is illustrated an alternative embodiment of the traffic sign device according to the invention. The device includes said warning means 1 with two light emitting units 2 and each unit is arranged at an independent traffic information symbol 3. The two symbols 3 are known as warning for road-work and warning for slippery roadway, respectively. With this device it is possible to vary the warning level by analogy with previous description herein. For instance, the light emitting unit 2 at the symbol for road-work could be activated on the occasions when road-workers are present at the road-work site of interest and the unit 2 at the symbol for slippery roadway could suitably be activated when for instance the roadway recently has been covered with asphalt. Here it is emphasized that in this case, as well as in other embodiments of the invention, the warning means can be designed with light emitting units, which can be controlled separately with respect to the activated and non-activated state.
In Fig 3 and 4 is illustrated traffic sign devices according to the invention including said warning means 1 applied and designed such that the warning means 1 itself constitutes said traffic information symbol 3 or a substantial part thereof both when the warning means is in an activated state and in a non-activated state.

The three light emitting units 2 in the device according to Fig 3 have a shape and location on a sign 5 such that these units 2 form the previously described traffic information symbol 3 for indicating the distance to a present crossing. When the warning means 1 is in a non-activated state, i.e. not obtains any current supply, the warning means 1 accordingly does not emit any light and the traffic sign device serves in a conventional manner via its design and colour setting. However, the units of the warning means can be made of a material of reflecting type so that road-users can be made aware to a greater extent than what is normally the case even when the warning means is in a non-activated state. When activating the warning means 1, this will emit light and by that also the traffic information symbol 3 and consequently the possibility to more efficiently transmit the traffic information message of the sign 5 to road-users is obtained.

In Fig 4 another embodiment of the traffic sign device according to the invention is illustrated in which the warning means 1 has such a design that the warning means 1 constitutes the traffic information symbol 3 or at least a substantial part thereof both when the warning means 1 is in an activated state and in a non-activated state. The embodiment is related to a traffic sign in the shape of a warning sign 5 intended to warn drivers of animals, and especially of elks. In that the light emitting unit/units 2 of the warning means 1 is/are designed to visually depict the elk and/or for instance the triangular frame of the
warning sign 5, the possibility to give road-users information in a common way in a non-activated state of the warning means 1 is obtained. And in an activated state of the warning means 1 the information transmission capability is increased considerably since the traffic information symbol 3 then emits light. The warning means 1 will in connection herewith be given that colour or the colours and the degree of light transmission required for the warning means to work in both non-activated and activated state. This also holds for the light emitting units of the warning means according to the embodiment illustrated in Fig 3.

In Fig 5 is illustrated an installation according to the invention comprising three traffic signs 6, 7, 8 provided with warning means 1. The traffic signs are situated along a highway 9 at a railway crossing 10. When activating the warning means 1, which advantageously can be done in phase with the activation of a signal equipment 11 generally present at railway crossings, the warning means 1 emit visible light for making road-users aware that there is reason to be extra careful.

In the embodiment the traffic signs 6, 7, 8 include different traffic information symbols 3 of distance indicating type for the purpose of indicating to road-users the distance between the respective traffic sign including the traffic information symbol and the crossing 10. For the warning means 1 to harmonize with the current traffic information symbols 3 and emphasize the visual impression of the respective traffic sign, a first traffic sign 6 located furthest away from the crossing has a warning means 1 including three light emitting units 2, a second traffic sign 7 has a warning means including two light emitting units 2 and a third traffic sign 8 located closest to the crossing has a warning means 1 including one light emitting unit 2.
In addition, the first traffic sign is arranged with a further traffic information symbol 12 for illustrating that the traffic signs can be combined with other existing traffic information symbols.

To be able to control the current supply to the warning means 1, the installation is equipped with a signal processing and control unit 20, schematically shown in Fig 6. The signal processing and control unit 20 can, in addition to receiving signals from other signal systems and/or from sensors, influence an energy source 40 such as an electric network, electrical plant, batteries or corresponding thereto, such that the warning means 1 obtains required energy supply from the source (arrow in Fig 6 indicates connection to the warning means 1) to be brought into the activated state, for instance when a train approaches the crossing.

In combination with the traffic signs according to the invention, the installation in the example also comprises a supervision member 21, shown in Fig 6-9, for supervising the crossing area 22 in a crossing. The supervision member 21 suitably includes some kind of detector 23 which is able to detect whether there are such larger objects, for instance vehicles or people, present in the crossing area 22 which could constitute a danger to traffic. Furthermore, this detector 23 is connected to the signal processing and control unit 20 which provides for interpretation of the signals from the detector 23 and, on relevant detection, ensures that the warning means 1 of the traffic signs obtains required current supply.

The supervision member 21 illustrated in Fig 6-9 is adapted to supervise the crossing area 22, for instance the area between railway gates 26, at crossings of a railway 24 and a second way 25 so as to detect objects present in the crossing area 22 which imply obstacles to the train or similar which travels on the railway 24.
In Fig 6 and 7 a detector 23 is schematically shown. This detector 23 is arranged to transmit detection signals and to receive their reflection caused by objects. The detector 23 is reciprocally pivoted to transmit the detection signals in an angular area. This angular area is indicated with the angle V in Fig 6 and 7. To be more precise, this angular area V is restricted by a direction R1 extending substantially in parallel with said railway 24 and a direction R2 extending substantially perpendicular to the railway 24.

In a manner schematically indicated in Fig 6, the detector 23 is connected to the signal processing and control unit 20 and arranged or adjustable/programmable to process signals obtained from the detector 23 to restrict the detection of foreign objects to a distance value varying in the pivoting angular area V so as to achieve an effective detection area corresponding to the crossing area to be supervised. In practice, crossing areas in general are substantially rectangular. Along the direction R1 the effective detection distance can in connection therewith correspond to substantially the width of said second railway 25 or for instance half thereof if a further detector exists for the other half of the way, whereas the effective detection distance along the direction R2 normally is the width of the crossing area 22 transversal to the railway 24 itself.

To achieve the intended detection area such signal processing is thereafter carried out in the signal processing and control unit 20 that the effective detection distance will vary as the detector is pivoted between the directions R1 and R2 such that the supervision device only reacts if there is any object within this effective detection area, for instance a vehicle or a person which should not be there by rights at the time in question. This consequently means that the signal processing and control unit 20 is correlated to the gate operating arrangement and/or the
crossing signal equipment or otherwise obtains information about when trains are in a hazardous vicinity and starts the detection function only when there is real danger.

In addition to providing for activation of the warning means 1, as previously described, the signal processing and control unit 20 is arranged to

   a) control an operating arrangement 27 to raise the gate 26 and/or

   b) control a signal arrangement 28 to indicate to an approaching train that objects are in the crossing area and/or

   c) control an automatic train stop arrangement 29 to stop the approaching train when objects have been detected in the crossing area.

It is furthermore preferred that the signal processing and control unit 20 is arranged or adjustable to react only to objects with a surface above a certain value. This surface value should be adjusted to be less than the one which can be expected by a human being but such that there is no unnecessary reaction for small animals.

Raising of the gate 26 can be performed for instance when a vehicle present in the crossing area 22, which vehicle possibly have been stuck in the crossing area at an earlier moment, shall be moved from the crossing area, while an approaching train already has obtained necessary stop signal, so as to avoid the gate being wrecked.
The detector with advantage comprises a laser, the light of which forms the detection signals.

As also apparent from Fig 6 and 7, the detector 23 can be arranged on the gate 26 itself for blocking the crossing area 22.

In Fig 8 it is illustrated somewhat more in detail how the detector 23 can be arranged in a cassette 30, which in turn may be received in a space 32 arranged in the area of the articulated suspension 31 of the gate 26 and designed in the gate. Thus, the detector 23 with sweep motor and electronics is mounted within said cassette 30, which suitably can consist of a transparent plastic pipe. This plastic pipe is sealed in a moisture proof and dust proof way at top and bottom. The cassette 30 is mounted and secured in the space 32 and after that it is sealed with a tight fitting cover. The electrical connections are made with special moisture protected connection members with quick coupling. On a wall of the space 32 there is formed a window 33, through which the detection signals of the detector pass.

According to an alternative, the detector 23 can be arranged separately, as shown in Fig 9, which furthermore enables arrangement of the detector 23 also in crossings which not include railway gates, on a pole 34 and/or a fundament of some kind secured relative to the ground. Also in this case it is suitable that the detection area of the detector is substantially rectangular and that the area is restricted by the directions mentioned above.

It is given that the invention not is restricted to the embodiments described above but that a plurality of modifications are possible within the scope of the inventive idea. It is consequently emphasized that the invention only is restricted to the scope of protection defined by the following patent claims, it
being particularly pointed out that equivalent embodiments are covered within the scope of the patent protection.
Claims

1. A traffic sign device with at least one traffic information symbol (3), comprising at least one warning means (1) which may be activated by means of energy supply for emitting visible light for the purpose of increasing the capability of the device to transmit information to road-users, characterised in that the warning means includes at least one light emitting unit (2) arranged at said traffic information symbol (3) or at a substantial part of the traffic information symbol.

2. A device according to claim 1, characterised in that the warning means (1) includes at least two light emitting units (2), each unit being arranged at a respective independent traffic information symbol (3) or at a respective substantial part of the traffic information symbol.

3. A device according to claim 1 or 2, characterised in that the warning means (1) may be activated by means of energy supply to emit intermittent visible light.

4. A device according to claim 1, 2 or 3, characterised in that at least one of the traffic information symbols (3) or any substantial part thereof is of distance indicating type.

5. A device according to claim 1, 2, 3 or 4, characterised in that the device is arranged to transmit information to road-users in connection to a specific traffic section.

6. A device according to claim 4 and 5, characterised in that the device is arranged to give the distance between the device and the traffic section in connection to the specific traffic section, e.g. a crossing of two ways.
7. A device according to claim 6, **characterised** in that the traffic section includes a crossing of a highway and a railway, the device being located at the highway.

8. A traffic sign device with at least one traffic information symbol (3), comprising at least one warning means (1) which may be activated by means of energy supply for emitting visible light for the purpose of increasing the capability of the device to transmit information to road-users, **characterised** in that the warning means has such a design that the warning means constitutes said traffic information symbol or a substantial part thereof both when the warning means is in an activated state and in a non-activated state.

9. A device according to claim 8, **characterised** in that the warning means (1) may be activated by means of energy supply to emit intermittent visible light.

10. A device according to claim 8 or 9, **characterised** in that at least one of the traffic information symbols (3) or any substantial part thereof is of distance indicating type.

11. A device according to claim 8, 9, or 10, **characterised** in that the device is arranged to transmit information to road-users in connection to a specific traffic section.

12. A device according to claim 10 and 11, **characterised** in that the device is arranged to give the distance between the device and the traffic section in connection to the specific traffic section, e.g. a crossing of two ways.

13. A device according to claim 12, **characterised** in that the traffic section includes a crossing of a highway and a railway, the device being located at the highway.
14. An installation for making, in connection to a specific traffic section, road-users on a way, e.g. a highway (9), aware that there is reason to be careful, the installation comprising at least two traffic signs (6, 7, 8) located along the way and at different distances from the traffic section, characterised in that said traffic signs each includes at least one warning means (1) for emitting visible light which may be activated by means of energy supply.

15. An installation according to claim 14, characterised in that the traffic section includes a crossing (10) of a first and a second way, e.g. a first way in the form of a railway and a second way in the form of a highway, the installation comprising said at least two traffic signs (6, 7, 8) located along the second way and at different distances from the crossing.

16. An installation according to claim 14 or 15, characterised in that the warning means (1) may be activated by means of energy supply to emit intermittent visible light.

17. An installation according to claim 14, 15 or 16, characterised in that at least one of said traffic signs (6, 7, 8) comprises a traffic information symbol (3).

18. An installation according to claim 17, characterised in that at least one of said traffic signs (6, 7, 8) including at least one traffic information symbol (3) has said warning means (1) with such a design that the warning means constitutes said traffic information symbol or a substantial part thereof both when the warning means is in an activated state and in a non-activated state.

19. An installation according to claim 17 or 18, characterised in that at least one of the traffic information symbols (3) or any substantial part thereof is of distance indicating type for the
purpose of indicating to road-users the distance between the traffic sign (6, 7, 8) including the traffic information symbol and a specific traffic section (10).

20. An installation according to claim 14 and possibly any further preceding claim, characterised in that the installation comprises at least three traffic signs (6, 7, 8) located along said way (9) at different distances from the traffic section (10), each including a warning means (1).

21. An installation according to claim 17, 19 and 20 and possibly any further preceding claim, characterised in that the installation comprises said at least three traffic signs (6, 7, 8) located along a way (9) and at different distances from the traffic section (10), each traffic sign including said traffic information symbol (3) of distance indicating type, which traffic information symbols are different from each other, for the purpose of indicating to road-users on the way the distance between the respective traffic sign and the traffic section.

22. An installation according to claim 21, characterised in that said traffic signs are a first traffic sign (8) comprising the warning means (1) with one light emitting unit (2), a second traffic sign (7) comprising the warning means (1) with two light emitting units (2) and a third traffic sign (6) comprising the warning means (1) with three light emitting units (2).

23. An installation according to claim 17 and possibly any further preceding claim, characterised in that one or more of the traffic signs (6, 7, 8) include said warning means (1) with at least one light emitting unit (2) arranged at said traffic information symbol (3) or at a respective substantial part of the traffic information symbol (3).
24. An installation according to claim 17 and possibly any further preceding claim, characterised in that one or more of the traffic signs include said warning means (1) with at least two light emitting units (2), each unit being arranged at a respective independent traffic information symbol (3) or at a respective substantial part of the traffic information symbol (3).

25. An installation according to any of claims 14-24, characterised in that the installation includes a signal processing and control unit (20) to provide for control of the energy supply to the warning means (1).

26. An installation according to claim 25, characterised in that the installation includes a supervision member (21) comprising a detector (23) for supervising the crossing area (22) of a crossing in connection with said crossing, so as to detect objects present in the crossing area by means of the detector (23), and that the supervision member (21) is connected to the warning means (1) through said signal processing and control unit (20), for turning on the energy supply to the warning means when objects have been detected so as to activate the warning means to thereby emit visible light.

27. An installation according to claim 26, characterised in that the detector (23) for transmitting detection signals and receiving their reflection caused by objects may be pivoted to transmit the detection signals in a substantially rectangular angular area (V), and that the detector is connected to the signal processing and control unit (20), which is adjustable/programmable for processing signals obtained from the detector (23) to restrict the detection of foreign objects to a distance value varying in the pivoting angular area (V) so as to achieve an effective detection area corresponding to the substantially rectangular crossing area to be supervised.
28. An installation according to claim 27, characterised in that the angular area (V), in which the detection signals are transmitted, is restricted by a direction (R1) extending substantially in parallel with said first way and by a direction (R2) extending substantially perpendicular to said first way.

29. An installation according to any of claims 25-28, characterised in that the signal processing and control unit (20) is arranged to

a) control a gate operating arrangement (27) to raise possibly occurring gates (26) and/or

b) control a signal arrangement (28) to indicate to an approaching train that objects are in the crossing area and/or

c) control an automatic train stop arrangement (29) to stop approaching trains
### INTERNATIONAL SEARCH REPORT

#### A. CLASSIFICATION OF SUBJECT MATTER

**IPC7:** E01F 9/00, B61L 29/24  
According to International Patent Classification (IPC) or to both national classification and IPC

#### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC7:** B61L, E01F, G09F  
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
SE,DK,FI,NO classes as above  
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.  
See patent family annex.

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**Date of the actual completion of the international search:**  
21 December 1999

**Date of mailing of the international search report:**  
26-01-2000

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